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ABSTRACT

The effects of three teaching styles in Mosston's Spectrum of Teaching Styles were examined in terms of the motor skill acquisition and social skill development of 96 randomly selected fifth grade students, who were taught a hockey accuracy task. Performance data were collected prior to, midway through, and following training and were analyzed: (1) within treatment groups to determine if learning was evident: and (2) across treatment groups to examine the relative effectiveness of the three styles. Social skill patterns were obtained by observing learner-to-learner verbal interactions in which dyads of learners were asked to "help" each other learn the task. All three groups learned the task comparably well. It can be concluded that the three styles are all effective in facilitating learning on the type of algorithmic psychomotor task studied. Style C, in which learners work in dyads, one performing the task while being provided with feedback by the other, was found not only to produce comparable task learning, but also to enhance significantly social skill development. (Author/FG)

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THE EFFECTS OF TEACHING STYLES ON MOTOR PERFORMANCE, SELF-CONCEPT, AND SOCIAL SKILL DEVELOPMENT

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Abstract

The effects of teaching styles B, C and E of Mosston's Spectrum of Teaching Styles were examined in terms of the motor skill acquisition and social skill development of 96 randomly selected fifth-grade children, who were taught a hockey accuracy task using these three alternative teaching styles. Performance data were collected prior to, midway through, and following training and were analyzed (1) within treatment groups, to determine if learning was evident, and (2) across treatment groups, to examine the relative effectiveness of these three styles. Social skill patterns, observational data focusing on learner-to-learner verbal interaction during a second task in which dyads of learners were asked to "help" each other learn the task, were also examined. A 3x3 ANOVA for repeated measures revealed that all three groups learned the task and that they learned it comparably well. It can be concluded that these three styles are all effective in facilitating learning on the type of algorithmic psychomotor task studied. Style C, in which learners work in dyads, one performing the task while being provided with formative feedback by the other, was found not only to produce comparable task learning, it was found also to significantly enhance social skill development.

THE EFFECTS OF TEACHING STYLES ON MOTOR PERFORMANCE, SELF-CONCEPT AND SOCIAL SKILL DEVELOPMENT

Michael Goldberger[1,2]

Gage (1978) defines teaching as the process of one person, the teacher, attempting to "facilitate learning on the part of another." Learning is viewed as the product of this process and may be inferred from changes in the learner's behavior (Gagne, 1970). Research on teaching, which attempts to establish lawful relationships between teaching behavior and learning outcomes, falls within the "process-product" paradigm described by Doyle (1978).

For the process-product study presented in this paper, teaching was defined further by "The Spectrum of Teaching Styles" (Mosston, 1972), a theoretical schema of eight interconnected teaching styles (Styles A through H) all derived from the same decision-making framework. This framework partitions decisions about the teaching/learning transaction into three sets: pre-impact (planning decisions), impact (execution decisions), and post-impact (assessment decisions). Each style has a unique theoretical structure determined by who, teacher or learner, makes which decisions. Decisions systematically shift along the spectrum to form eight distinct, yet connected, styles, which provide alternative models of teaching/

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[1]Michael Goldberger was a visiting scholar with the IRT during the 1980 spring term. He was on leave from Temple University in Philadelphia, Pennsylvania.

[2]The contributions of James Chamberain, East Stroudsburg State College and Phillip Gerney, Cheltenham Schools (Pennsylvania), in data collection and of Joe Byers, IRT, in data analysis are gratefully acknowledged.

learning behavior, ranging along a theoretical continuum from complete teacher to complete learner decision making (see Figure 1). For example, in Style A, the teacher, theoretically, makes all decisions. The learner's role, in this arrangement, is to obey.

The value of any style of teaching lies in the conditions for learning and the nature of the interpersonal transaction it provides. A logical analysis of any style leads to conjecture about its probable effects on learning outcomes. No style is generally "good" or "bad." Each, because of its unique structure and the conditions it provides, has its own assets and liabilities. It would make sense, for example, to expect routine exposure to the conditions provided by Style A to enhance, among many other possible outcomes, a learner's compliance behavior (i.e., a learner's ability to effectively follow directions).

Pre-imp.	(T)	(T)	(T)	(T)	(T)	(T)	(T)	(L)	
Impact	(T)	(L)	(Per)	(L)	(L)	(L)	(L)	(L)	
Post-imp.	(T)	(T)	(Obs)	(L)	(L)	(L)	(L)	(L)	
Teacher									Teacher
Maximum	A	B	C	D	E	F	G	H	Minimum
Learner									Teacher
Minimum	Command style	Practice style	Reciprocal style	Self-check style	Slanty rope style	Guided Discovery style	Problem-solving style	Learner designed program style	Maximum

(T) = decisions made by teacher
(L) = decisions made by learner
(Per) = performer decisions
(Obs) = observer decisions

Figure 1. Overview of the Spectrum of Teaching Styles (from Mosston, 1972, revised in 1980).

Research on the Spectrum

A review of research in which the spectrum was used to define treatments returns a weak yield of disappointing findings (Mariani, 1970; Dougherty, Note 1; Boschee, Note 2; Brant, Note 3; Jacoby, Note 4; McCleary, Note 5; Chamberlain, Note 6; Gerney, Note 7; Virgilio, Note 8). These studies, all conducted by graduate students in physical education, should be viewed as pioneering efforts since they were completed during the early development of the spectrum as a unified theory of teaching and of research on teaching as a scientific discipline.

Mariani (1970), after studying the effects of Styles A and B on tennis stroke performance, reported that the group taught with Style B displayed significantly better performance than the group taught with Style A on one of the two strokes following the treatment. However, Style B as operationalized in Mariani's study differed from Style B as defined by Mosston. Under Mariani's conditions, the learner had "the authority to decide how many repetitions of a particular task to make." Based on the theoretical structure of Style B (Mosston, 1972), the teacher makes decisions about the quantity of performance.

Dougherty (Note 1) compared the effects of Styles A, B, and D on the development of physical fitness and selected motor skills. His results indicated no significant differences among the treatment groups following 14 weeks of training, although different developmental patterns were observed during training. Virgilio (Note 8) compared the effects of a direct strategy (Style B), in which the teacher assessed learner performance, and Style C, in which pairs of learners assessed each others performance, on motor skill acquisition and other outcomes. He found no significant differences as a result of the treatments.

to be found among these styles, on either psychomotor attributes (Mosston, 1965) or algorithmic psychomotor forms (Goldberger, Note 9), than might be expected when comparing those styles with Styles F through H; more heuristic styles. This appears to be supported both logically and empirically.

McCleary (Note 5), studying the effects of Styles B and G on skill acquisition and higher-order cognitive functioning of kindergarten and first-grade children, and Bryant (Note 3), studying the effects of Styles B and C on skill acquisition and social-skill development of middle-school boys, found no significant differences. Both of these projects suffered from three common methodological problems: (1) the length and distribution of training was insufficient to produce meaningful effects, (2) the dependent measures lacked reliability, and (3) the same teacher taught one intact group per treatment.

Other Research on Teaching Related to the Spectrum

The effects of teaching in physical education have been studied for decades, resulting in a bulk of information but few significant findings (Locke, 1977). An analysis of this literature exposes a number of recurring problems, such as poorly defined treatments, unreliable instrumentation, and weak research designs. These problems raise questions about the validity of these studies and make even significant results suspect (Goldberger & Gober, 1978).

However, within the literature, studies on motor learning show certain consistent results. This research emphasizes the same dependent variable, psychomotor performance, but instead of a focus on the teaching/learning transaction, the focus is on selected conditions of learning, such as the type and timing of feedback or the disbursement of practice sessions.

Practice refers to repeated attempts to master a task (Cronbach, 1977) and, in combination with other relevant conditions, it positively affects learning in both the cognitive (Rosenshine, 1978) and psychomotor (Oxendine, 1968) areas. Style B, by its design, maximizes time for practice. Following the task presentation, learners make nine decisions about their relationship to the task as they engage in the activity. These decisions, which do not affect the task per se, do allow for some personal comfort-related adjustments in learning conditions during performance (pace of work, specific location and posture, starting time, and more). While the learners are practicing, the teacher provides one-to-one feedback to selected learners. This style of teaching is well within the definition of the direct, teacher-centered, formal, didactic styles described by other writers.

Style C is structurally similar to Style B except that feedback, instead of being given periodically by the teacher, is given after every practice trial by a peer. This is done by having the learners choose partners. As one partner does the task, the other observes the performance and provides feedback based on criteria supplied by the teacher. Theoretically, not only should performance improve due to immediate feedback, but the social skills involved in giving and receiving feedback from a partner should also be enhanced.

One liability of this style is that, because of the reciprocation time between peers, some actual practice time is lost. There is evidence to suggest, however, that mental practice of the kind the observer experiences enhances performance (Nixon & Locke, 1973).

In Style E, two more sets of decisions shift to the learner. Whereas the teacher or peer provides feedback about performance in Styles B and C, and the learner assesses his/her own performance in

Style D based on criteria supplied by the teacher, in Style E the teacher provides alternative levels of the same task (i.e., multiple levels with varying degrees of difficulty) so learners can choose the most appropriate level for themselves. These levels range from less difficult to more difficult along a continuum. For example, if the skill to be learned is jumping over an extended rope, the rope would be slanted so that one end is high and the other end is low.

The application of this "slanty rope" principle (Mosston, 1972) seems so appealing as to be obvious. However, research generally fails to support reasoning behind the slanty-rope principle. Learning a skill at less or more difficult levels of the same task by manipulating factors within that task (such as target distance, target size, or weight of equipment) does not produce significantly more learning than practicing the actual skills (Nixon & Locke, 1973).

In defining intrinsic motivation, Deci and Porac (1978) explain that underlying human behavior is a cyclical pattern in which people "seek out and conquer challenges that are optimal for their capacities." If children are continually subjected, over an extended period of time, to tasks which are perceived as too difficult, and if participation leads to systematic failure, they inevitably begin to generalize about their inadequacies as learners. Children who constantly fail at learning tasks and are reminded of this by their teachers, classmates, and parents, must come to view themselves with generally negative self-concepts as learners (Bloom, 1976).

On the other hand, if a task contains multiple levels of difficulty, as Style E does, learners may select the levels they feel are optimal for their present capacities, based upon personal assessment at that point in time. It is assumed that this kind of arrangement would:

1. Be intrinsically motivating, if the task itself was interesting, thus producing maximum time-on-task behavior.
2. Encourage the development of a positive self-concept as learners gain competence as a function of decisions they make.
3. Encourage maximum achievement on tasks because the conditions for learning are tailor-made for the particular learner.

A 1976 evaluation of the spectrum by Pichert, Anderson, Armbruster, Surber and Shirey (Note 10) found that spectrum teachers (teachers trained in and using spectrum of teaching styles on a regular basis), appear to (1) give more individual attention to students, (2) display less less domination in academic discussions, and (3) make more efficient use of class time, compared to a matched sample of non-spectrum teachers. They conclude that "the spectrum appears to aid teachers in implementing procedures and strategies known to contribute to high student achievement" (Pichert et al., Note 10).

Statement of Purpose

The present study used an experimental rather than correlational design. The treatments employed Styles B, C, and E under laboratory conditions to examine their effects on selected learner outcomes. Although its scope was narrow (N=96), significant results were anticipated due to a number of methodological considerations:

1. The independent variable (the three levels of teaching style) was defined and verified in behavioral terms, in contrast to poorly-defined treatments such as traditional versus innovative or teacher-centered versus individualized instruction.

2. The laboratory setting and randomization procedures, in contrast to most field-based work, allowed for the control of extraneous variables that affect the treatments (e.g., classroom distractions, differences in intact groups).

3. The learner-achievement measures, to be described, provided direct measurements of psychomotor and social performance.

Based on an analysis of the theoretical structure of these particular styles of teaching and a review of the relevant literature, hypotheses were formed concerning the relationships of these styles to skill acquisition and social skill development. The major hypotheses were that:

1. All three treatment groups would (1) learn the task and (2) learn it equally well, but that (3) exceptional learners, those particularly good or poor performers, would benefit most from the conditions provided by Style E.

2. Low self-concept children would benefit most by the conditions provided by Style E.

3. Social skill development, specifically those behaviors associated with giving to and receiving feedback from a peer, would be enhanced under the conditions provided by Style C.

Method

Subjects for this study consisted of 96 fifth-grade children, 48 males and 48 females, who were randomly selected from 122 volunteer children. Sixteen boys and 16 girls were then randomly assigned to each of three treatment groups; each treatment gorup thus had 32 members. The children had been exposed to selected episodes using the spectrum of teaching styles as a normal part of their regular physical education class over the previous three months.

This study employed a pretest-posttest/control-group design (Campbell & Stanley, 1963), in which the Style B group served as the control group (Fitzgibbon & Morris, 1978). The children learned a psychomotor accuracy task under the three experimental conditions. Training consisted of 60 treatment trials divided into two 30-trial practice sessions. (During pilot work, sets of 60 trials, under Style B conditions, were found to produce significant learning.)

Psychomotor performance was measured by scores on a hocket accuracy task, adapted from Skinner (Note 11). The task involved shooting a puck into a target area calibrated to yield scores ranging from 0 through 30. Knowledge of results, a major factor underlying these treatments (i.e., the post-impact decisions), was controlled by placing a screen between the child and the target area. Use of a chart provided accurate knowledge of results. Performance data were collected at three points during the training period (i.e., prior to, midway through, and following training) to document the effects of the differential treatments.

Prior to training, children in both the Style B and the Style E groups completed two paper-and-pencil self-concept instruments, the Piers-Harris Children's Self-Concept Measure (Piers, 1969) and the Florida Key (Purkey, Cage, & Graves, 1973), which would allow examination of any differential effects of training for low and high self-concept individuals. The Piers-Harris instrument is an 80-item forced choice questionnaire reported to have a reliability coefficient of .77 with fifth-grade children (Wing, Note 12). Approaching the measure of self-concept from a different perspective, teachers using the Florida Key, rated the self-concepts of the learners under their charge.

A third measure of self-concept was also computed. After the children finished their practice and posttest trials on the hockey accuracy task, they were asked to predict their average score, based on their past experience, over an additional ten test trials. Their prediction was called the Predicted Score (PS). They then completed those additional 10 trials. The score on each trial was subtracted from the PS and summed across the ten trials, yielding a discrepancy score (DS) which was considered another measure of self-concept.

The reason for collecting three very different measures of self-concept was a concern for the construct validity of this variable. These three measures should be found to correlate, at least marginally, with each other. Low and high self-concept subgroups were formed by taking those children with scores beyond a half-standard deviation above the mean (high self-concept) and those with scores a half-standard deviation below the mean (low self-concept) on each of the three measures.

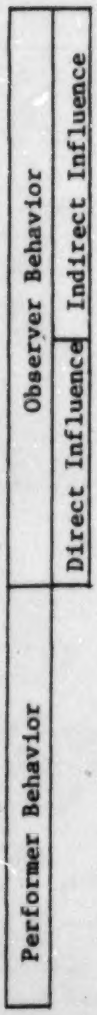
This same bifurcating technique was employed in forming subgroups of exceptional learners by motor performance. Those children scoring a half-standard deviation above the mean on the midtest of the hockey accuracy task were placed in the high skill group; those scoring half a standard deviation below the mean were placed in the low skill group. Again, the subgroups were formed to examine the differential effect of the treatments of these two types of learners.

Spectrum theory would suggest that these learner types would probably do better, or least have a better opportunity for learning under Style E conditions, because the learner can select the level of task difficulty.

These conditions would appear to be beneficial particularly to learners who have poor self-concepts as performers and to learners who are low in skill or ability. Learners will typically select levels of difficulty which will ensure their success in the task.

Finally, children in Style B and C groups were randomly paired within their treatment groups and given an additional 30 trials, in which they each used their non-dominant hand. (Here performance was not of concern.) They were asked to "help your partner learn this task" during which time the verbal dialogue within the dyad was recorded using a Flanders-like coding system (Goldberger, 1974) (see Figure 2). The purpose was to characterize the social interaction patterns of the pairs as they "helped" each other.

Testing and treatments were administereed outside the classroom setting to control for as many extraneous variables as possible. Children were randomly called to the testing area in self-formed dyads (i.e., they selected their own partners within the same sex group for the training sessions). Information about the task and about the treatment, that is, descriptions of the role expectations associated with the particular style, were introduced to both children in each pair using Style A and a prepared diaglogue. All the children were reminded of the specific learner decisions appropriate for the treatment group to which they were assigned. Under the Style B conditions, these children were reminded of the sets of impact decisions they were responsible for making (i.e., exact starting time, pace of the performance, interval between trials, and so on). Under the Style C conditions, the children were provided with a feedback format and ways of providing helpful feedback. The alternative levels of the task were



1. Accepts feelings.
2. Praises or encourages.
3. Accepts ideas of the performer.
4. Asks questions.
5. Questions initiated by the observer directed to the teacher.
6. Gives information.
7. Gives directions (to be complied with).
8. Gives corrective statements.
9. Criticizes or justifies authority.
10. Performer response.
11. Performer accepts corrective statement.
12. Performer initiated action.
13. Questions to the observer.
14. Silence or confusion.

Figure 2. Reciprocal coding system.

explained to the Style E children and they were given time to discuss these options with the teacher.

In Styles B and E, the children decided who would go first and, while one performed the task, the other waited outside the testing area. Then they switched roles and the second child performed the task. In Style C, the children also decided who would go first, but as one did the task the other reciprocated by providing the feedback called for by the style theory. Then they switched roles. In order to control the amount of training time across the three treatments, the Style C group did only 30 performance practice trials on the task, while Style B and E groups did 60 performance trials. Of course, the Style C children also did 30 non-performance trials (i.e., mental practice trials) as they assessed their partner's performance and provided feedback.

The teaching behavior of the two instructors was controlled by (1) exposing both instructors to rigorous training in spectrum theory and practice under the supervision of Professor Mosston; (2) observing and assessing the actual teaching behavior of both instructors in natural settings using all styles (This was done both before and following the experiment.); (3) providing verbatim dialogues, developed from the theoretical models, for use during the training; (4) observing the two instructors during the treatment sessions to verify fidelity; and (5) randomly assigning instructors to treatments, then switching instructors after each pair of children was treated.

Although the mode of delivery and the amount of feedback differed across treatments, as is dictated by spectrum theory, the provision for feedback within the three groups was controlled in the following ways: (1) the final location of the puck (i.e., where the puck landed in the target area) was accurately displayed using a standardized chart, (2) corrective comments, those concerning the direction and force of the shot, were uniformly provided, and (3) positive reinforcement, including such comments as "well done," or "good job," or "you're improving," was systematically provided.

To simulate natural conditions, feedback was provided differentially. To simulate the Style B conditions, feedback was provided following every fifth trial. (This feedback-to-trial ratio was probably richer than that found in most school situations.) Under Style C conditions feedback was provided by a partner after every trial. Again, it should be noted that in this attempt to simulate natural conditions, children in the Style C group did only 30 performance trials, 15 during the first practice session and 15 in the second. Finally, under Style E conditions, the frequency of feedback was selected by the investigators as the factor upon which to base the alternative levels of the task (i.e., the varying degrees of difficulty from which the children could choose). Under the Style E condition they could elect to receive feedback in increments ranging from after every trial to electing not to receive feedback at all. Selecting this latter factor to provide multiple levels for the Style E group created some difficulties, as I will discuss later.

To determine the effects of these treatments on the dependent variables, data were subjected to the following analyses. Performance data were studied both within treatments, to see if learning took place, and between treatments, to determine the differential effects of the three styles. A 3x3 Analysis of Variance (ANOVA) technique was used for repeated measurements at the three levels of the treatment and the three levels of the hockey accuracy task trials. Comparisons of exceptional learners and low and high self-concept subgroups were analyzed by means of independent ANOVAs (Ferguson, 1966).

Results and Discussion

The effects of teaching styles B, C, and E on skill acquisition were examined individually. Then, to focus more closely on the influence of Style E, the three were further analyzed by subgroups of exceptional learners (i.e., both high- and low-skilled children and high and low self-concept children). Student-to-student interaction data were analyzed to determine the effects of Style C on social-skill development.

Motor Performance Results

Means and standard deviations for the three treatment groups across the three sets of the hockey accuracy test trials are presented in Table 1. A 3x3 analysis of variance with repeated measurements on the trials factor was used to determine the effect of these three styles, both within and between treatment groups. While a significant main effect due to blocks of trials was found ($F = 92.44$, $df = 2/282$, $p < .01$), neither the main effect due to treatments nor the interaction effect were found to be significant in these analyses (see Table 2). The nonsignificant results of treatments supported the hypothesis that these particular styles of

Table 1.

Means and Standard Deviations of Pretest, Midtest, and Posttest SHT Scores for Treatment Groups B, C, and E

Style	B			C			E		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Pretest	32	21.32	5.00	32	20.60	5.18	32	19.99	4.70
Midtest	32	24.57	3.04	32	24.16	3.50	32	23.13	3.94
Posttest	32	25.77	2.47	32	25.06	2.72	32	23.74	3.41

Table 2.

Analysis of Variance for Three Levels of Trials (Pretest, Midtest, Posttest) in Treatment Groups B, C, and E

Source of Variation	DF	SS	MS	F
Treatment	2	915.76	457.88	1.10
Error	93	38798.80	417.19	
Trials	2	3996.98	1998.49	92.44**
Interaction	4	12.98	3.24	0.15
Error	282	6097.17	21.62	

** $p < .01$

teaching would all produce similar task-performance levels on the examined task because they provide similar learning conditions. It should be noted that the treatments' main effects were analyzed across all three levels of the trials factor.

A polynomial trend analysis, employing a covariate term (computed from selected pretest trials to adjust for initial differences), revealed that while the Style B group's scores were significantly higher than the Style E group's scores, the slopes of their curves were statistically identical. This analysis shed no light on the question of the relatively low mean scores for the Style E group except to suggest that although the Style E group did adequately learn the task, the qualitative level of their learning was somewhat negatively affected due to unknown factors. A poor choice of the factor to be manipulated and a lack of role clarity may have had a negative effect on the Style E group's performance. But, as Figure 3 shows, the Style E group started out low and stayed low in their performance throughout the training.

Post hoc comparisons, utilizing Tukey's HSD[3] test (Kirk, 1968) revealed significant differences ($p < .01$) between the pre- and posttest scores within each of the three treatments. The results confirmed that all three groups learned the task, and that all three treatments were effective. This supports the major hypothesis contending that these three treatments would all be effective in facilitating learning of the type of task used in this study.

Style B Results

Style B, the treatment which most resembles direct teaching (Rosenshine, 1978), proved to be an effective way of teaching this

[3]Honestly significant difference.

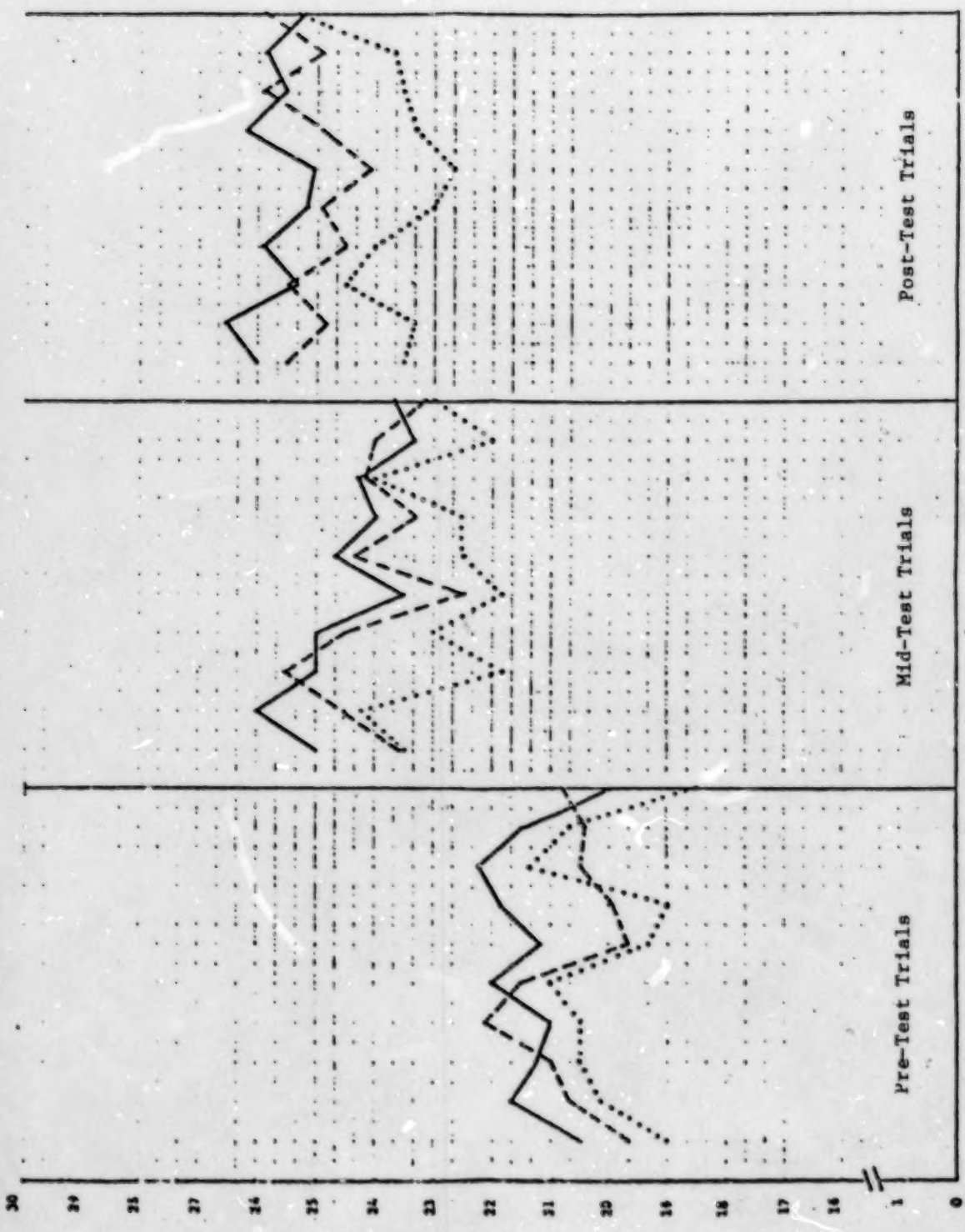


Figure 3. Pre-, Mid-, and Posttest mean performance scopes by treatment group.

task ($t = 4.72$, $df = 31$, $p < .01$). This finding makes sense because Style B provides clear role expectations, near-maximum time for practice (or task engagement), and for systematic teacher evaluation. Both Table 1 and Figure 3 show that during the three sets of test trials the Style B learners had both the highest mean score across each set and the highest mean trial within each set. An examination of this low within-group variability, particularly during the posttest set of trials, also suggests that this treatment provided conditions which were generally profitable for most learners. (In examining the actual treatment trials, data not presented here, it was interesting to note that increases in performance were evident on the trial following the provision of feedback by the teacher, i.e., after every fifth trial. This observation emphasizes the importance of feedback, in this case knowledge of results, in learning motor skills.)

Style C Results

Children under Style C treatment also learned the task ($t = 5.99$, $df = 31$ $p < .01$). They not only learned it well compared to the other groups, but they learned it with half the number of treatment performance trials. Of course, they did receive the same total number of trials as the other groups, but half of these were mental practice trials done as an observer.

The value of mental practice has been documented (Corbin, 1972). While Corbin does suggest that more sophisticated research is needed, he says that "there seems to be little doubt that mental practice can positively affect skilled-motion performance." Bloom (1954) generalized, based on some of his early work, that "a student's achievement is related to his participation in class whether that participation be overt or covert or both." Studying the incorrect performance of another person can help improve the performance of the observer (Nixon & Locke, 1973).

Students taught with Style C learned efficiently. Efficiency is defined here in terms of how quickly (i.e., in how few trials) a group reached a selected criterion score. This score was determined by computing a percentage gain from the baseline score. The Style C group reached this score (X=22) earlier than either of the other two groups. This finding is plausible in light of what is known about the benefits of rich and frequent feedback, particularly during the early stages of motor learning (Whiting, 1975).

Social Behavior Data

Tables 3 and 4 show the results of comparing Style B and C groups on social behavior variables. Randomly paired dyads within the same treatment and sex groups were asked to "help your partner learn this task." The task, a hockey accuracy task, was not the focus; social behavior was. Interaction data were summarized on 14x14 matrices and comparisons were made on cell and column totals and on a number of computed "patterns" (such as the "affective pattern," which is the sum of Columns 1 and 2). Over 50 comparisons were made. Most revealed significant differences between these two groups. Included here are three representative findings: (1) the first comparison (Variable AA) indicates that the Style C observers (the partners providing the feedback) demonstrated significantly more empathy (Category 1) and used significantly more praise, encouragement, and positive reinforcement (Category 2) when compared to their Style B counterparts ($F = 29.93$, $df = 1/62$, $p < .01$); (2) the analysis of Variable AB shows that, when provided with corrective feedback (Category 6), the Style C performers used feedback more effectively, significantly more often than the control group ($F = 7.44$, $df = 1/62$, $p < .01$); and (3) performers requested feedback from their partners significantly more often in the Style C group ($F = 45.80$, $df = 1/62$, $p < .01$) than in the Style B group.

Table 3.

Means and Standard Deviations of Social Behavior

Data for Treatment Groups B and C

Style	B			C		
Variable	N	Mean	SD	N	Mean	SD
AA	32	4.11	5.21	32	12.01	6.38
AB	32	10.32	10.20	32	16.12	8.17
AC	32	2.27	2.26	32	7.96	4.22

Table 4.

ANOVA of Social Behavior Data

for Treatment Groups B and C

Variable	Source of Variation	SS	DF	MS	F
AA	Treatment	1014.52	1	1014.52	29.93**
	Error	2101.83	62	33.90	
AB	Treatment	635.36	1	635.36	7.44**
	Error	5292.10	62	85.36	
AC	Treatment	525.04	1	525.04	45.80**
	Error	1235.94	62	11.47	

**p < .01

These findings clearly suggest the influence of the Style C training on the development of those social skills associated with giving and receiving feedback. Whether these findings transfer to other situations, whether the treatments persist over time, and whether other social learning behavior could be taught similarly are questions of import that should be studied.

These findings appear to be particularly profound not only in terms of their statistical significance but in their intuitive appeal and practical applicability. Rich, one-to-one, immediate, formative feedback (i.e., feedback during performance), seems an ideal condition for learning. Style C provides this condition, with no apparent sacrifice to the partner's level of learning, in an equal time period, and with the decided benefit of social skill development. These tutorial-like conditions seem particularly appropriate both for the initial learning of a new task and for those who experience difficulties in learning.

I have found the following suggestions worthwhile in implementing Style C.

1. It should be used particularly when (a) social development is an objective and/or (b) a rich supply of feedback is necessary (e.g., during early skill acquisition).

2. Criteria should be selected which are (a) highly relevant to success and (b) intrinsic to the task (i.e., the criteria are not observable to the performer, thus reinforcing the role of the observer).

3. Criteria themselves should (a) be clearly expressed and understood by all learners before reciprocation begins (a demonstration is effective), (b) be of sufficient quantity to be helpful but be neither overwhelming nor insufficient, and (c) include intermediate steps, clues, and/or suggestions proven helpful in learning the particular task so that the observer can provide feedback.

4. During the introduction of Style C, when the role relationships are being explained, the teacher should emphasize specifically what the observer and the task performer are to do and not to do during the execution of their roles. During the introduction it is helpful for the teacher to provide explicit suggestions about about feedback (e.g., to be descriptive and not judgmental) when performing the observer's role.

5. During the actual execution and reciprocation, the teacher should be available to (a) respond to observer questions, (b) monitor the execution of both the role and content performance, and (c) provide reinforcement to to the observers about their role performance.

Style E Results

While the Style E group adequately learned the task ($t = 3.11, df = 31, p < .01$), the results proved to be a disappointment in several other respects. Throughout the training the teachers noted incongruities in the behavior of these children. In accordance with spectrum theory, the children were urged to work at a level of difficulty they felt was appropriate for them during the treatment trials. Difficulty level selection appeared to be decided upon in almost random fashion. Also, the children appeared to lack the motivational levels exhibited by individuals in the other two groups.

In retrospect, it appears that, due to at least two shortcomings in the treatment design, this style was not given an adequate test of it's theoretical potential. The investigators felt they had little control over the major factors within this particular task, specifically, distance from the target and size of the target were dictated by the apparatus. The use of modified equipment, so often appropriate for Style E episodes, was not deemed relevant to performance in this task. Research design precluded manipulation of the number of practice trials and other factors relating to the performance conditions.

The factor selected for manipulation (upon which alternative levels of difficulty were fashioned) was the frequency of feedback. This proved to be a poor choice because the learners were apparently unable to use this factor to manipulate the task to suit their individual needs.

It appeared that Style E, in particular, caused learner conflict in understanding exactly what their role was. This may explain both the ambivalent attitude observed by the teachers and the initial, and continuing, depression in performance exhibited by students in this treatment group. Perhaps the idea of having to work at a self-selected qualitative level, as is dictated by spectrum theory, was so contrary to the normal experience of these children that it caused this unanticipated reaction.

Results with Exceptional Learners

It was hypothesized that the conditions associated with Style E would give exceptional learners the kind of task engagement that would facilitate high performance levels (p. 9, #1). This hypothesis was not supported (see Table 5). While all six subgroups profited from their training, the between-group differences were not significant. Furthermore, it appears that the larger change in scores exhibited by the low-skilled group were more an artifact of instrument scaling than of true improvement.

Finally, it was hypothesized (p. 9, Hypothesis 1, part 3) that children with very low self-concepts, and perhaps those with very high self-concepts, would profit particularly from the conditions for learning provided by Style E, since Style E provided the opportunity for each learner to select the level of difficulty most appropriate for him or her and the opportunity to assess one's own performance. Three measures of self-concept were employed. For each measure in each

Table 5.

CANOVA of Posttest SHT Scores for Low- and High-Skilled Children for Treatment Groups B, C, and E

Variable	Source of Variation	SS	DF	MS	F
Low Skilled	Covariate	27.13	1	27.13	4.37*
	Treatment	2.77	2	1.39	.22
	Error	136.70	22	6.21	
High Skilled	Covariate	.12	1	.12	.02
	Treatment	6.87	2	3.43	.56
	Error	177.81	29	6.13	

*p < .05

Table 6.

Means and Standard Deviations of Performance Improvement Scores (SHT) for Low and High Self-Concept Children in Treatment Groups B and E

	Style B		Style E	
Group	Mean	SD	Mean	SD
[1] Low Self-Concept	5.44	4.22	2.59	4.90
High Self-Concept	2.23	3.33	4.08	2.66
[2] Low Self-Concept	3.05	2.96	2.40	3.52
High Self-Concept	6.04	7.67	3.92	2.57
[3] Low Self-Concept	4.16	4.62	4.56	5.26
High Self-Concept	2.26	3.05	3.58	3.46

1. Determined by the Piers-Harris (self-concept measure)
2. Determined by the Florida Key (self-concept measure)
3. Determined by the Discrepancy Score (self-concept measure)

Table 7.

Intercorrelations Among the Three Measures of Self-Concept and the Predicted Scores for Treatment Groups B & E

Variable	1	2	3
1. Discrepancy Score	--		
2. Piers-Harris	-.19	--	
3. Florida Key	-.13	.28	--
4. Predicted Score	-.38	.34	.12

Table 8.

ANOVA of Performance Improvement Scores Low and High Self-Concept Children in Treatment Groups B and E

	Source of Variation	SS	DF	MS	F
[1]Low Self-Concept	Treatment	6.67	1	6.67	.49
	Error	177.71	13	13.67	
[1]High Self-Concept	Treatment	.69	1	.69	.04
	Error	324.47	19	17.08	
[2]Low Self-Concept	Treatment	2.08	1	2.08	.20
	Error	162.24	16	10.14	
[2]High Self-Concept	Treatment	23.80	1	23.80	1.02
	Error	510.67	22	23.21	
[3]Low Self-Concept	Treatment	.60	1	.60	.02
	Error	342.72	14	24.47	
[3]High Self-Concept	Treatment	8.66	1	8.66	.79
	Error	209.38	19	11.01	

[1]As determined by the Piers-Harris

[2]As determined by the Florida Key

[3]As determined by the Discrepancy Score

treatment group, two subgroups of high and low self-concept children were formed (see Table 6). Intercorrelations among these three measures and a fourth measure, the prediction score, were low (see Table 7). With this in mind, analyses of these self-concepts were performed (see Table 8). None of these comparisons proved to be significant; they were not analyzed further because of the low intercorrelations. Self-concept continues to be an interesting, but an elusive, trait.

Conclusion

All three styles of teaching examined appear to be appropriate for instructional use with the kind of task employed in this study. Confirming spectrum theory, Style C was found to significantly enhance social skill development and if this is an objective, Style C would appear to be most appropriate for instructional use. Finally, this study should be repeated, using a different factor for level development in the Style E group, to more appropriately test the exceptional learner hypothesis.

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